

REMARKS

In response to the Final Office Action mailed October 21, 2003, Applicant respectfully requests reconsideration. To further the prosecution of this application, claim amendments and arguments are submitted herewith.

Claims 1-31 were pending in this application. By this amendment, Applicant has amended claims 1, 10, and 27. Accordingly, claims 1-31 are pending for examination, with claims 1, 10, and 27 being independent claims. No new matter has been added.

Claim Rejections Under 35 U.S.C. §102

Claims 1-31 stand rejected under 35 U.S.C. §102(b) as purportedly being anticipated by U.S. Patent No. 5,508,664 to Rizzo. Applicant respectfully traverses this rejection.

Discussion of Rizzo

Rizzo teaches an oscillator that maintains a desired duty cycle by adjustment of a reference voltage, a current source, or a current sink (Abstract). As shown in Figure 3, the asymmetrical oscillator 50 includes a comparator 52, switches 54, 56, 84, and 86, and an averaging circuit 62. A fixed reference voltage 58 is also provided (col. 3, lines 34-39), as is an averaging circuit (col. 3, lines 42-43). A current source 72 and current sink 74 are connected to a capacitor 70 (col. 3, lines 31-53). Capacitor 70 is connected between the inverting input of comparator 52 and ground (col. 3, lines 43-45). The signal OSC is obtained from the output of comparator 52.

The function of the oscillator depends on the behavior of the switches. Switches 54 and 84 are closed when the output of comparator 52 is high (col. 3, lines 55-56). Since switch 54 is closed, fixed reference voltage 58 is supplied to the comparator 52 at the non-inverting input (col. 3, lines 56-58). During this time, since switch 84 is closed, the current source 72 charges capacitor 70 (col. 3, lines 56-58). The current source 72 charges capacitor 70 until the voltage of capacitor 70 is greater than the fixed reference voltage 58, at which time the output of comparator 52 will switch to a low state (col. 3, lines 58-60). Switches 54 and 84 then open, and switches 56 and 86 close (col. 3, lines 60-61). Since switch 56 is closed a reference voltage 60 is

applied to comparator 52 at the non-inverting input (col. 3, lines 61-64). Since switch 86 is closed the current sink 74 discharges capacitor 70 (col. 3, lines 61-64). Current sink 74 discharges capacitor 70 until the voltage on capacitor 70 is lower than the reference voltage 60, at which time the output of comparator 52 will switch back to a high state (col. 3, lines 65-67). The oscillator will then repeat the behavior previously described for the case of a high value at the output of comparator 52 (col. 3, line 67).

Averaging circuit 62 acts to adjust the lower reference voltage 60 as needed to maintain a precise duty cycle (col. 4, lines 1-4, lines 43-46). Specifically, the lower reference voltage 60 is proportional to the difference between the voltage on capacitor 104 and the voltage across resistor 108 (col. 4, lines 15-19). The voltage across resistor 108 is fixed (col. 4, lines 19-20). The voltage across capacitor 104 is an average of the voltage on capacitor 70, which itself is a sawtooth voltage (col. 4, lines 14-15). If the average voltage of capacitor 70 is less than ideal, or greater than ideal, then the averaging circuit will shift the lower reference voltage 60 appropriately (col. 4, lines 21-23, lines 38-43). In this manner, the averaging circuit accounts for errors in the duty cycle which may be caused by delays introduced by the opening and closing of the switches (col. 4, lines 23-46). The averaging circuit 62 includes a capacitor 104 Rizzo does not teach that the averaging circuit compensates for temperature induced changes in circuit operation. Furthermore, Rizzo does not teach a temperature independent oscillation frequency for the oscillator of Figure 3. For instance, temperature may affect the charge and discharge rates of capacitor 70, which may then alter the output frequency of comparator 52. The averaging circuit 62 would not correct such a temperature dependent frequency shift as long as the average value of capacitor 70 remained the same.

Claim 1 Distinguishes Over Rizzo

Claim 1 is directed to oscillator circuitry. The oscillator circuitry comprises a capacitor, capacitor charging means arranged to supply a current to charge the capacitor to a first predetermined threshold voltage, and capacitor discharging means arranged to discharge the capacitor to a second predetermined threshold voltage. As amended, the oscillator further comprises switching means arranged to switch between a capacitor discharging mode and a

capacitor charging mode responsive to reaching at least one of said threshold voltages, wherein the at least one threshold voltage is determined by a threshold setting means which provides a voltage threshold which varies to compensate for changes in temperature by varying a voltage difference between said first predetermined threshold voltage and said second predetermined threshold voltage to maintain an oscillation frequency substantially independent of temperature. The amendments were made merely to clarify the claimed subject matter, and support for the amendments can be found throughout the written description as well as in the figures. For instance, one aim of the claimed invention is to address the problem associated with known circuits that exhibit a temperature-dependent oscillation frequency (page 1, second paragraph). Figure 2 illustrates an example of one embodiment of the invention that provides an oscillation frequency that is substantially independent of temperature (page 5, third paragraph; page 9, second paragraph). Figure 3 illustrates an example of the behavior of the circuit of Figure 2, and shows that the oscillation frequency is maintained at a constant value.

As discussed above, Rizzo teaches an oscillator that maintains a desired duty cycle (Abstract, col. 4, lines 23-46). Rizzo does not teach oscillator circuitry comprising, *inter alia*, a threshold setting means which provides a voltage threshold which varies to compensate for changes in temperature by varying a voltage difference between said first predetermined threshold voltage and said second predetermined threshold voltage **to maintain an oscillation frequency substantially independent of temperature**, as claimed. Applicant respectfully asserts that providing a precise duty cycle is not the same as maintaining a constant oscillation frequency, and that it is possible to provide a precise duty cycle without maintaining a constant oscillation frequency. As previously noted in the description of Rizzo, the output frequency of comparator 52 of Rizzo can conceivably be temperature dependent as long as the average value on capacitor 70 is constant. Therefore, claim 1 distinguishes over Rizzo for at least this limitation. Accordingly, the withdrawal of the rejection of claim 1 under 35 U.S.C. §102(b) is respectfully requested.

Claims 2-9 and 11-14 depend from claim 1 and are allowable for at least the same reason.

Claim 10 Distinguishes Over Rizzo

Claim 10 recites oscillator circuitry comprising a capacitor, a capacitor charger arranged to supply a current to charge the capacitor to a first predetermined threshold voltage, and a capacitor discharger arranged to discharge the capacitor to a second predetermined threshold voltage. Claim 10 further recites a switch arranged to switch between a capacitor discharging mode and a capacitor charging mode responsive to reaching at least one of said threshold voltages, wherein the at least one threshold voltage is determined by a threshold setting means which provides a voltage threshold which varies to compensate for changes in temperature by varying a voltage difference between said first predetermined threshold voltage and said second predetermined threshold voltage to maintain an oscillation frequency substantially independent of temperature. As with claim 1, the amendments to claim 10 were made to clarify the claimed subject matter, and support for the amendments may be found, for example, in the same places as indicated previously in connection with the amendments to claim 1.

As discussed in connection with claim 1, Rizzo does not teach oscillator circuitry comprising, *inter alia*, a threshold setting means which provides a voltage threshold which varies to compensate for changes in temperature by varying a voltage difference between said first predetermined threshold voltage and said second predetermined threshold voltage **to maintain an oscillation frequency substantially independent of temperature**, as claimed. Claim 10 distinguishes over Rizzo for at least this reason, and therefore the withdrawal of the rejection of claim 10 under 35 U.S.C. §102(b) is respectfully requested.

Claims 15-26 depend from claim 10 and are allowable for at least the same reason.

Claim 27 Distinguishes Over Rizzo

Claim 27 is directed to a method of providing an oscillating voltage signal. The method comprises the acts of increasing a voltage signal until the voltage signal reaches a first threshold voltage, decreasing the voltage signal until the voltage signal reaches a second threshold voltage, and varying a difference between the first threshold voltage and the second threshold voltage in response to changes in temperature to maintain an oscillation frequency substantially independent of temperature. The amendments to claim 27 are similar to those previously

described in relation to claims 1 and 10, and support may be found in the same places of the specification and figures as those previously listed.

As discussed above in connection with claims 1 and 10, Rizzo does not teach a method of providing an oscillating voltage signal comprising, *inter alia*, varying a difference between the first threshold voltage and the second threshold voltage in response to changes in temperature **to maintain an oscillation frequency substantially independent of temperature**, as claimed. Claim 27 distinguishes over Rizzo for at least this reason, and accordingly the withdrawal of the rejection of claim 27 under 35 U.S.C. §102(b) is respectfully requested.

Claims 28-31 depend from claim 27 and are allowable for at least the same reason.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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